

REMARKS/ARGUMENTS

This paper is being provided in response to the February 17, 2005 Office Action for the above-referenced application. In this response, Applicant has amended Claims 1, 18, 31, 35 and 40 in order to clarify that which Applicant deems to be the claimed invention. Applicant respectfully submits that the amendments to the claims are all supported by the originally filed application.

Applicant thanks the Examiner for the allowance of Claims 8-11.

The Office Action sets forth an objection to the drawings with respect to Claims 1, 18, 31 and 42-44. This objection is addressed below in remarks made in connection with claim rejections under 35 U.S.C. 112, first paragraph. Applicant respectfully submit that, for reasons set forth below, the drawings show every feature of Applicant's claimed invention. In particular, as will be pointed out below, Figures 7A and 7B provide example illustrations of features recited in Claims 1, 18, 31, and 42-44. Accordingly, Applicant respectfully requests that the objection be reconsidered and withdrawn.

The rejection of Claims 31-33 and 35-41 under 35 U.S.C. 101 as being directed to non-statutory subject matter is hereby traversed and reconsideration thereof is respectfully requested. Page 3 of the Office Action states that Claims 31-33 and 35-41 recite "a computer readable medium" which is not defined to be within the scope of patentable subject matter (i.e., to exclude carrier waves and the like) and must be rejected as being non-statutory subject matter. Applicant respectfully submits that the instant claims, as amended herein, are proper under 35 U.S.C. 101 without further amendment.

Claim 31, as amended herein, recites a computer program product including a computer readable medium for managing data in a cache. The computer readable medium comprises: processor executable code for providing a first cache memory containing data; processor executable code for providing a second cache memory containing data, wherein at least some of the data contained in the first cache memory is the same as at least some of the data contained in the second cache memory, wherein data contained in said first and said second cache memories includes control data and corresponding disk data, said control data being replicated in said first and said second cache memories regardless of a modification status of said corresponding disk data; and processor executable code for, in response to a request for data that is stored in both the first cache memory and the second cache memory, selecting which one of the first and second cache memories to use to obtain the requested data in accordance with an access balancing technique.

Applicant's Claim 31 is drawn to a computer program product which, by its nature, must be performed on or with the aid of a computer. Claim 31 also recites claim elements of "processor executable code" for performing the recited functions as set forth in the language of the particular claim elements. In order for this code to be useable with a computer processor, the code must be stored in some medium from which the computer processor is able to read the code. Applicant has thus amended Claim 31 to more explicitly and clearly recite that the processor executable code is stored in such a computer readable medium.

In view of the foregoing, Applicant respectfully requests that the rejection of Claims 31-33 and 35-41 be reconsidered and withdrawn.

The rejection of Claim 19 under 35 U.S.C. 101 as being directed to non-statutory subject matter is hereby traversed and reconsideration thereof is respectfully requested.

Pages 3-4 of the Office Action states that Claim 19 depends from Claim 18. Claim 18 is directed to an apparatus and that Claim 19 is directed to an access balancing technique comprising machine executable code. Accordingly, the Office Action states that Claim 19 is directed to more than one statutory class of invention. Applicant respectfully disagrees. Claim 18 is directed to a system, and Claim 19 further recites other elements of that system which are machine executable code elements. Applicant fails to see how the foregoing recited machine executable code elements of Claim 19 are directed to a technique or method. The language recited in Claim 19 which states “wherein said access balancing technique is a first access balancing technique” is language included for the sake of providing proper antecedent basis for the “access balancing technique” as recited in Claim 18.

In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 1-3, 5-7, 12-19, 21-33 and 35-44 under 35 U.S.C. § 112 ¶1 is hereby traversed and reconsideration thereof is respectfully requested. Applicant respectfully submits that Claims 1-3, 5-7, 12-19, 21-33 and 35-44, as amended herein, are proper under 35 U.S.C. 112 ¶1.

Claim 1, as amended herein, recites, in relevant part, “A method of managing data in a cache, comprising: providing a first cache memory containing data; providing a second cache memory containing data, wherein at least some of the data contained in the first cache memory is the same as at least some of the data contained in the second cache memory, wherein data contained in said first and said second cache memories includes control data and corresponding disk data, said control data being replicated in both said first and said second cache memories regardless of a modification status of said corresponding disk data; ...”. Claims 2-3, 5-7, 12-17, and 42 depend therefrom.

Claim 18, as amended herein, recites, in relevant part, “A system for managing data in a cache comprising: a first cache memory containing data; a second cache memory containing data wherein at least some of the data contained in the first cache memory is the same as at least some of the data contained in the second cache memory, wherein data contained in said first and said second cache memories includes control data and corresponding disk data, said control data being replicated in both said first and said second cache memories regardless of a modification status of said corresponding disk data; ...”. Claims 19, 21-30 and 43 depend therefrom.

Claim 31, as amended herein, recites, in relevant part, “A computer program product including a computer readable medium for managing data in a cache, the computer readable medium comprising: processor executable code for providing a first cache memory containing data; processor executable code for providing a second cache memory containing data, wherein at least some of the data contained in the first cache memory is the same as at least some of the data contained in the second cache memory, wherein data contained in said first and said second

cache memories includes control data and corresponding disk data, said control data being replicated in said first and said second cache memories regardless of a modification status of said corresponding disk data ...”. Claims 32, 33, 35-41 and 44 depend therefrom.

In connection with Claim 1, Applicant respectfully submits that the recited elements of *said control data being replicated in both said first and said second cache memories regardless of a modification status of said corresponding disk data* is described in the originally filed application in accordance with the requirements of 35 U.S.C. 112, first paragraph as will be described in following paragraphs.

For example, Applicant refers to Figure 7A and Figure 7B which are described at page 15, line 5- page 16 line 20 of the specification. Figure 7A is a flowchart of steps performed in connection with providing data from a disk storage area to the cache memories to read data into the cache. It is determined which of the cache memories is the primary storage area for the data by consulting the primary/secondary table (step 102). Data is copied from the disk storage area into one of the caches corresponding to the primary storage area (step 104). The corresponding control data element for both of the cache memories is marked to indicate that the corresponding data is in cache indicating that the data has been read into the cache. As discussed elsewhere in Applicant’s specification, the control data for each of the slots of the cache memories is duplicated. Thus, the control data element for any slot in one of the cache memories is made to equal the control data for the other slot in the other one of the cache memories by writing the control data to both of the cache memories. Applicant respectfully submits that the foregoing sets forth example portions of the specification (text and figures) describing that control data is replicated in both cache memories when the disk data has not been modified. Further, this

example indicates that the disk data is only included in one of the cache memories designated as the primary storage area.

As an example of when control data is replicated in both cache memories when the disk data has been modified and is included in both cache memories, Applicant refers to Figure 7B which includes steps performed in connection with data in the cache that has been modified, such as, for example, by a write from a host. The steps of Figure 7B may be executed sometime after data has been read into the cache from the disk storage area or may never be executed at all for some of the cache data (e.g., if the cache data is not modified). The block of data that is being modified is written to both cache memories (step 112). In each instance where data is modified, it is written to both of the caches. However, the first time data from a slot is modified while in the cache, other steps are also taken. The remainder of the sector that includes the modified block is copied from the primary to the secondary cache (step 114). The control data for the particular slot, in both the memories, is marked to indicate that the slot is write pending indicating that the data has been modified while stored in the cache (step 116). As discussed elsewhere, the control data is written to both the primary and second storage areas. Applicant respectfully submits that the foregoing sets forth example portions of the specification (text and figures) describing that control data is replicated in both cache memories regardless of a modification status of the disk data.

Taken together, Figures 7A and 7B describe processing steps for initially reading data from the disk storage area into only one of the caches and setting corresponding control data in both of the caches. Subsequently, when the disk data in the cache is modified, the disk data is

replicated in both caches and the corresponding control data in both caches is updated to reflect the modification status of the disk data.

Claim 42 recites the feature of *when said corresponding disk data has not been modified and said control data is replicated in said first and said second cache, said corresponding disk data is only in one of said first and second cache memories*. Applicant respectfully submits that Figure 7A and corresponding portions of the specification as pointed out above also provide support for Claim 42. The state of the disk data when read from the disk storage area into the cache as described in connection with Figure 7A illustrates an “unmodified” state of the disk data. The disk data is included in only the primary cache memory and the corresponding control data is replicated in both cache memories.

Applicant respectfully submits that, as set forth above, Claims 18 and 31 recite features and corresponding claim language similar to the foregoing feature of Claim 1. Accordingly, Applicant respectfully submits that Claims 1, 18 and 31 are in compliance with the requirements of 35 U.S.C. 112, first paragraph.

Applicant respectfully submits that Claims 43 and 44 recite features and corresponding claim language similar to the foregoing feature of Claim 42. Accordingly, Applicant respectfully submits that Claims 42-44 are in compliance with the requirements of 35 U.S.C. 112, first paragraph.

In connection with Claims 31-33 and 35-41, the Office Action cites further rejections under 35 U.S.C. 112, first paragraph. In particular with reference to the claim language related to a computer readable medium, page 7 of the Office Action states that the specification does not provide an adequate written description of a computer program product which is stored on a computer readable medium. The Office Action further states that while a computer program product is disclosed, storing it on a computer readable medium is not disclosed.

As discussed above, Applicant's Claim 31 is drawn to a computer program product which, by its nature, must be performed on or with the aid of a computer. Claim 31 also recites claim elements of "processor executable code" for performing the recited functions as set forth in the language of the particular claim elements. In order for this code to be useable with a computer processor, the code must be stored in some medium from which the computer processor is able to read the code. Applicant respectfully submits that disclosure in the specification of a computer program product and the disclosure of the computer program product including machine executable code provides support for the computer readable medium as set forth in amended Claim 31.

In view of the foregoing, Applicant respectfully requests that the rejection be reconsidered and withdrawn.

The rejection of Claims 18-19, 21-33, 35-41 and 43-44 under 35 U.S.C. § 112 ¶2, has been addressed by Claim amendments provided herein in accordance with the guidelines provided in the Office Action. In particular, Applicant has amended independent Claims 18 and

31 to remove references to the term “independent” which the Office Action appears to indicate is the claim language serving as a basis for this rejection.

Additionally, Applicant notes that Page 8 of the Office Action states that Claim 19 purports to be both a machine and a process combining two statutory classes of invention into a single claim. Applicant has addressed this rejection as applied to Claim 19 for reasons set forth above regarding the rejection of Claim 19 under 35 U.S.C. 101. Applicant respectfully submits that Claim 19 is drawn to only a single statutory class of invention and that Claim 19 is in compliance with the requirements of 35 U.S.C. 101.

In view of the foregoing, Applicant respectfully requests that this rejection be withdrawn.

Based on the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is sincerely encouraged to contact the undersigned at 617-248-4042 in order to expedite placing this case in condition for allowance.

Respectfully submitted,
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